A NEW SPECIES OF THYLACOLEO AND NOTES ON SOME CAUDAL VERTEBRAE OF PALORCHESTES AZAEL

Alan Bartholomai
Queensland Museum

The Darling Downs area of south-eastern Queensland consists mainly of extensive fluviatile deposits of Upper Cainozoic Age. Woods (1960) indicated that the Chinchilla Sand, developed in the valley of the Condamine River in the north-western Darling Downs, was probably deposited earlier than the Pleistocene alluvia to the south-east.

Specimens of the genus *Thylacoleo* Owen in the collections of the Queensland Museum were revised by Woods (1956) and those from the south-eastern Darling Downs were attributed to *T. carnifex* Owen. A small proportion of fragmentary material from the Chinchilla district was tentatively separated as possessing features sufficiently distinct to constitute a possible new species. Recently, a partial right mandibular ramus was collected from the Chinchilla Sand at the Chinchilla Rifle Range (Rifle Range Number 78, parish of Chinchilla), supporting the view that the variations are characteristic, and the material is here described as a new species.

All measurements are in millimetres.

THYLACOLEO CRASSIDENTATUS sp. nov.

(Figures 1, 2)

Material. F.3565, holotype. A partial right mandibular ramus with I_1 broken, $P_3 - M_2$, young adult. Chinchilla Sand, at 363677 Chinchilla 4 mile military map, possibly Pliocene.

Specimens from the Chinchilla Sand at Chinchilla, north-western Darling Downs: F.2957, partial right mandibular ramus, no teeth preserved. F.2961, partial left mandibular ramus with both P_3 and M_1 broken, very aged. F.2962, partial right mandibular ramus with P_3, adult. F.2960, partial left mandibular ramus with M_2, aged. F.2964, partial left mandibular ramus with I_1 broken, P_3, juvenile. F.2963, broken left P_3, adult. F.2495, partial left mandibular ramus with P_3, adult. F. 2941, partial right maxilla with both P^3 and M^1 broken, adult. F.2954, partial right maxilla with both P^3 and M^1 broken, adult. F.2955, partial right maxilla with P^3, adult.

Specimens from the Darling Downs: F.3569, partial right mandibular ramus with both I_1 and P_3 broken, M_1, adult. F.3570, partial left mandibular ramus with M_1, adult. F.3571, partial left mandibular ramus. F.3572, partial left mandibular ramus with both P_3 and M_1 broken, aged.

Measurements of Mandibles

Specimen	Length of crown of P_3	Breadth of P_3 above posterior root	Length of crown of M_1	Breadth below metaconid of M_1	Angle between I_1 and base of mandible
Holotype, F.3565 . .	37·0	14·1	15·5	11·3	42°
F.2962	35·6	13·6	—	—	—
F.2964	36·2	13·5	—	—	—
F.2495	41·4	14·3	—	—	—
F.2961	—	—	—	—	39°
F.3569	—	—	13·3	10·0	42°
F.3570	—	—	14·9	10·8	—
F.3572	—	—	15·5	11·5	—

Ramus deep, strong, particularly robust in region of implantation of cheek teeth; longitudinal axis very slightly convex laterally; symphysis unfused; symphysial plane short, deep, subequilaterally triangular, somewhat upturned. Fossa subalveolaris deep, confluent; mental foramen prominent, ventral to anterior margin of P_3 and antero-dorsal to junction of anterior margin and inferior surface of ramus at blunt angle; lateral alveolar walls of P_3 thinning, roots becoming exposed with age, with simultaneous development of inter-rootial depression. Ramus ascending at low angle posterior to smooth, weak diagastric process ventral to M_2; postalveolar ridge not prominent, ascending gradually posteriorly, disappearing on mesial wall of large coronoid process. Process diverging from line of ramus, directed antero-posteriorly; antero-dorsal margin ascending at approximately 45°, grooved, laterally flanged; flange continuing ventrally on body of ramus limiting large, anteriorly deep, ectocoronoid fossa. Wall of fossa perforated by masseteric foramen opening into inferior dental canal close to mandibular foramen. Condyle, postero-mesial angle of ramus and posterior portion of coronoid process not preserved.

Lower median incisor broken, but enough remains to indicate the presence of shallow, posterior longitudinal furrows; lingual furrow best developed. I_1 making an angle of approximately 42° with base of mandible. P_1 and P_2 not retained; alveoli small, mesiad to anterior root P_3. Third premolar elongate, sectorial, very convex laterally, deeply rooted; roots directed somewhat dorso-laterally; base of crown swollen; enamel finely ridged vertically, particularly on lingual surface, thickened to flange on anterior edge; crown broadest above posterior root, not tapered posteriorly, asymmetric, with labial face set at much higher angle than lingual; prominent antero-lingual buttress associated with anterior cuspid. Main surface of wear near planar, developed ventro-lateral to cutting edge. Enamel also removed labially at base of crown. Molar series reduced. M_1 relatively large, subtriangular; anteriorly with metaconid high, flanged, with short longitudinal cutting edge in functional continuity with that of P_3; base of crown broad anteriorly due to development of prominent labial buttress; crown posteriorly reduced with low median ridged area and shallow, finely ridged, dorso-labial fossette. Facet of wear developed in continuation with that of P_3, and another directed postero-laterally; birooted, anterior root much larger than posterior. M_2 small, with single root partially divided lingually, not functional; crown with shallow, faintly ridged dorsal depression.

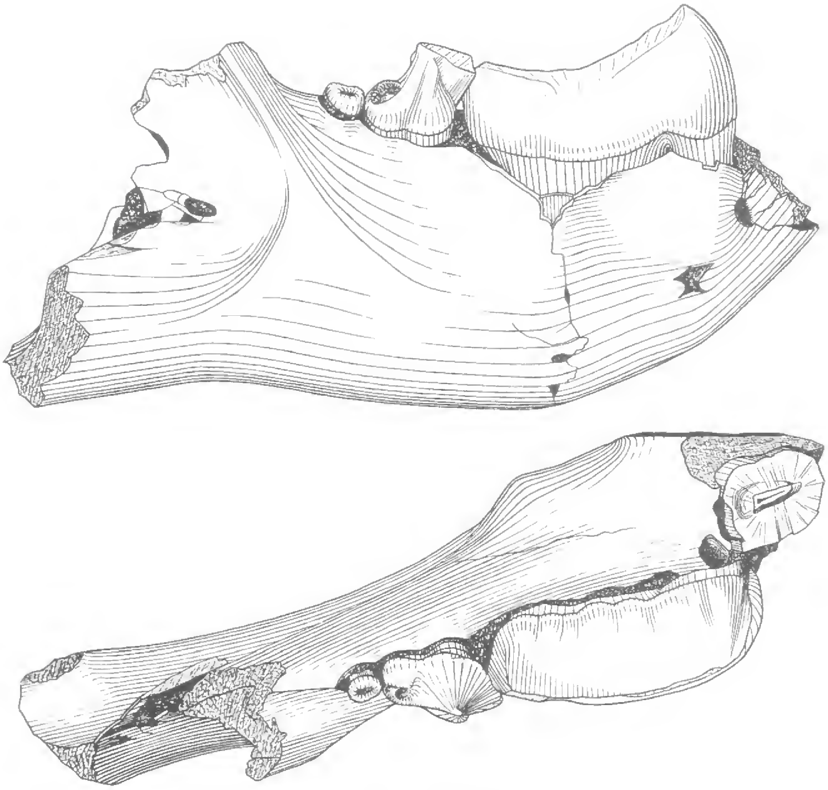

Figure 1. *Thylacoleo crassidentatus* sp. nov. F.3565, holotype. Right ramus, lateral and occlusal views. Natural size.

Woods (1956) compared the fragmentary *Thylacoleo* material from Chinchilla with *T. carnifex* from the south-eastern Darling Downs and discussed the differences exhibited. Although only slight dissimilarities are observed in the maxillary remains, the mandibles differ considerably.

The most significant feature is the structure of the cheek teeth and, in particular, that of the lower sectorial premolar, where the tooth is posteriorly much broader and the longitudinal convexity much stronger than in the corresponding P_3 of *T. carnifex*. M_1 exhibits a difference in relative proportions; it is comparatively stout owing to the greater width above both the anterior and posterior roots. The posterior portion of the crown is comparable with the size of the posterior root and exhibits a much wider median ridged area together with the development of a shallow, postero-labial fossette. The second molar, although variable developed, is stronger than in *T. carnifex* and its alveolus is partially divided by a vertical ridge on the lateral wall. In one specimen (F.2960), a depression immediately posterior to the relatively large second molar is interpreted as the alveolus of a very small third molar.

In addition, the ramus is much wider in the region of implantation of the cheek teeth and displays a less pronounced longitudinal concavity of the mesial side, while a more recumbent lower median incisor is indicated by the reduction of the angle between the incisor and the base of the mandible.

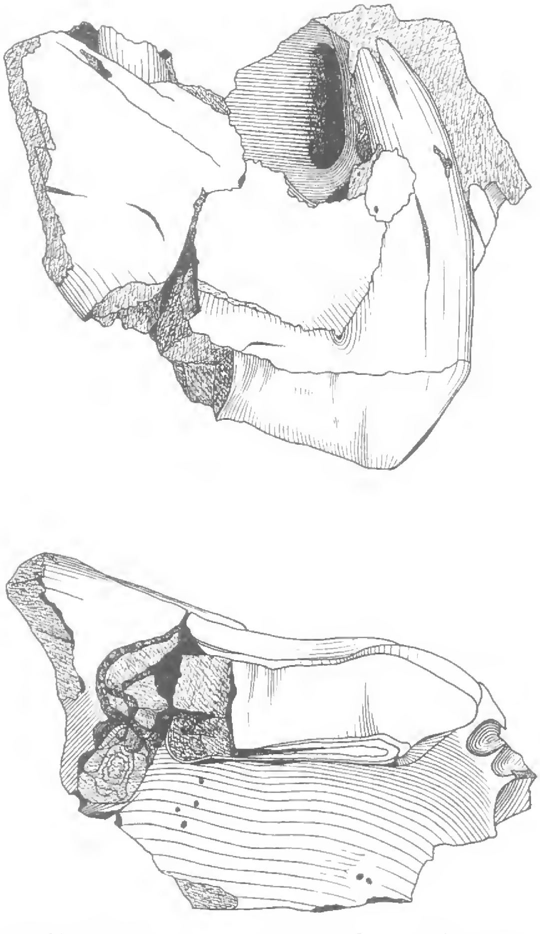

Figure 2. *Thylacoleo crassidentatus* sp. nov. Lateral and occlusal views of maxillary fragment (F.2954). Natural size.

Owing to the fragmentary nature of the preservation of the maxillary material in *T. crassidentatus* relatively few comparative measurements are possible. The third premolars exhibit no features which differ from those of *T. carnifex.* The base of the crown of the first molar in F.2954 is wider than in *T. carnifex*, while in F.2955 the tooth is more distinctly tri-rooted, the anterior root being largest, while the posterior roots are subequal. In addition, F.2954 exhibits a depression immediately posterior to M^1 and this is considered to represent the alveolus of a small second molar.

It is apparent that the molar series of *T. crassidentatus* are much less reduced both in size and numbers than in *T. carnifex*, a fact in keeping with the suggested time relationships of the two faunas.

VERTEBRAE OF *PALORCHESTES AZAEL* OWEN

(Figures 3, 4)

Six caudal vertebrae (F.3564), were recently located in position in the alluvia of " Strathmore " station near Collinsville, north-eastern Queensland, and were presented to the Queensland Museum by Mr. E. Cunningham. Associated with the series is a large number of post-cranial fragments together with an incomplete right mandibular ramus, the lower median incisors, and several maxillary fragments of *Palorchestes azael.* In view of the field association there can be little doubt that the vertebrae, interpreted as representing the first six of the caudal series, belong to this species.

Neural arches and zygopophyses are not preserved in first, fourth and fifth vertebrae, while transverse processes are broken in vertebrae five and six, and are poorly represented in the first. No chevrons are preserved.

DESCRIPTION

Vertebrae large, stout. All centra short antero-posteriorly, broader posteriorly than long and broadest in second. Length decreases from first to the fifth, then increases. Centra broadly convex inferiorly ; posterior depth greatest in first caudal vertebra, decreasing regularly to sixth. Epiphyses firmly fused. Floors of neural canals in anterior vertebrae subdivided by median ridges, on either side of which foramina pierce centra ; distal centra pierced by one foramen, with median ridges discontinuous. Neural arches moderately high and broad with neural spine quite high in second caudal, decreasing in development posteriorly and barely visible as low ridge in sixth vertebra. Zygopophyses functional in proximal vertebrae but with anterior zygopophyses reduced and functionless by sixth vertebra and with posterior zygopophyses lost. Transverse processes broadly expanded antero-posteriorly in anterior vertebrae, particularly at extremities, but are rounded at tips; processes decrease in transverse diameter and in antero-posterior expansion to sixth caudal.

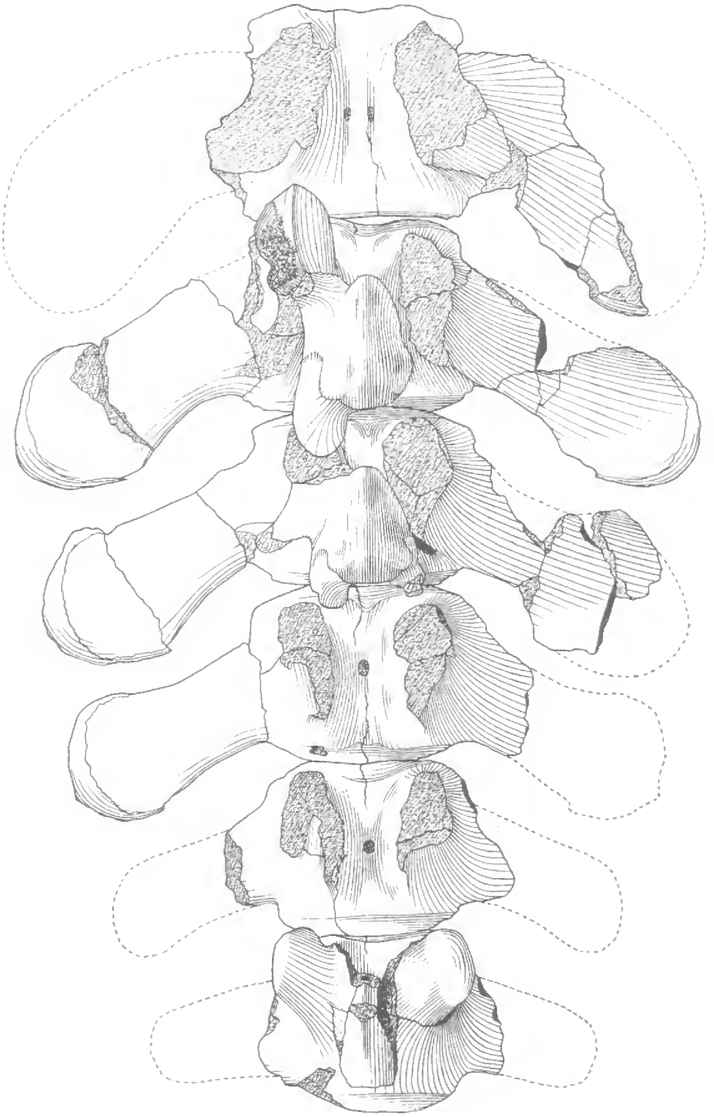

Figure 3. *Palorchestes azael* Owen. Dorsal view of caudal vertebrae (F.3564). One third natural size.

Measurements

Caudal Vertebra	Length of centrum	Posterior breadth of centrum	Posterior depth of centrum	Breadth across transverse process
1	79	86	62	—
2	71	87	60	272
3	68	80	58	247
4	66	74	56	236 (estimated)
5	66	70	54	—
6	68	69	51	—

In his revision of the species of *Palorchestes* Owen from south-eastern Queensland, Woods (1958) concluded that the genus belongs within the family Diprotodontidae and not within the Macropodidae as indicated by Owen and later workers. The erroneous idea of the systematic position of *Palorchestes* led Owen to attribute a number of post-cranial macropodid remains to the genus. Fletcher (1945) mentioned additional post-cranial fossils referred to *P. azael* in the collections of the Australian Museum, Sydney, but Woods doubted the identification because of the absence of field association. Woods has also indicated that the lower incisor found associated with post-cranial remains from the dune sandstone at Fowler's Cove, Nepean Peninsula, Victoria and tentatively referred by Gregory (1902) to this species, is of characteristic macropodid aspect and referable to one of the large extinct species of *Protemnodon* Owen.

Relatively few of the Australian fossil diprotodontids have their caudal vertebral series sufficiently well known to afford comparisons with those of *P. azael.* The posterior breadths of the proximal centra in *P. azael* and *Diprotodon optatus* Owen exceed the lengths, but while the centra of *D. optatus* are shallow posteriorly owing to the flattening of the inferior surfaces, those of *P. azael* are similar in structure to the macropodids. Gill and Banks (1956) and Scott (1915), show that the centra of *Nototherium tasmanicum* Scott are structurally similar to those of *D. optatus.* The transverse expansion of the transverse processes and the rounding of the process extremities in *P. azael* is similar to that of the other diprotodontids, and is especially similar to that of *N. tasmanicum.* The anterior neural canals, however, are comparable with those observed in the Macropodidae, being high and comparatively broad, but contrasting markedly with the low, very broad neural canals in *D. optatus.* In conjunction with this feature, the zygopophyses in the proximal caudal vertebrae of *D. optatus* are much reduced and functionless, while the neural spines are represented by extremely low tubercles. This is similar to the structure observed in *N. tasmanicum* but is in direct contrast to the well-developed, functional zygopophyses and moderately high neural spines in *P. azael.*

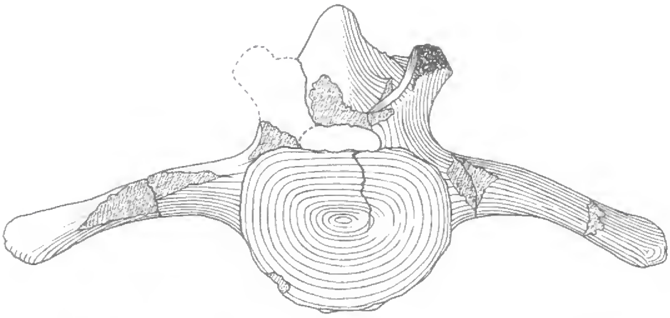

Figure 4. *Palorchestes azael* Owen. Anterior view of second caudal vertebra (F.3564). One third natural size.

Tedford (1959) recorded a palorchestine diprotodontid from the Etadunna Formation of possible Oligocene Age (Stirton *et al.*, 1961), at Lake Ngapakaldi and Lake Kanunka North, Tirari Desert, north-eastern South Australia, and noted that the tail was long and heavy.

The palorchestine diprotodontids were apparently lightly built, more mobile grazing animals than other members of the Diprotodontidae. Although the tail of *P. azael* differs considerably from that of *D. optatus,* it does appear to be structurally closer to that of *N. tasmanicum.* The structural similarities to the macropodid tail are believed to be related solely to body form and are not of general systematic importance.

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